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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/823,429	03/30/2001	Sanjay K. Agrawal	CISCP539	9399
26541	7590	05/18/2007	EXAMINER	
Cindy S. Kaplan P.O. BOX 2448 SARATOGA, CA 95070			TANG, KAREN C	
ART UNIT		PAPER NUMBER		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	09/823,429	AGRAWAL, SANJAY K.
Examiner	Art Unit	
Karen C. Tang	2151	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 3/29/07.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1,4,8,9,11,14,19,20,22,23,25,27,29,31 and 33-47 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1, 4, 8, 9, 11, 14, 19, 20, 22, 23, 25, 27, 29, 31, and 33-47 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO/SB/08)  
     Paper No(s)/Mail Date \_\_\_\_\_

4) Interview Summary (PTO-413)  
     Paper No(s)/Mail Date. \_\_\_\_\_

5) Notice of Informal Patent Application  
 6) Other: \_\_\_\_\_

- This action is responsive to the amendment and remarks file on 3/29/07.
- Claims 1, 4, 8, 9, 11, 14, 19, 20, 22, 23, 25, 27, 29, 31, and 33-47 are amended are for further examination.

## **DETAILED ACTION**

### ***Response to Arguments***

Applicant's arguments filed 3/29/07 have been fully considered but they are not persuasive.

Applicant argued that Claim 1 has been amended to clarify that the periodic worst-case delay is calculated by dividing the burst parameter by a share of output link bandwidth allotted to the queue and that the share of output link bandwidth is greater than or equal to the associated rate. As described in the specification, the associated rate is a specified bandwidth, which may be, for example, a negotiated rate agreed to by a customer sending traffic data. This value is used to calculate the burst-rate traffic profile and a burst parameter. After traffic is queued, it is sent out of the router on an output link. The output link has an associated output link bandwidth. Multiple queues can share an output link, with each queue allotted a share of the output link bandwidth. It is this share of the output link bandwidth that is used to calculate the worst-case delay. Applicants' invention, as set forth in the claims is particularly advantageous in that it allows for the worst-case delay to be analyzed under hypothetical conditions such as different output link bandwidth allocations. For example, a service provider can use the calculated worst-case delay to determine how much additional bandwidth to allocate to a class to achieve a desired decrease in delay. In another example, the associated rate can be set to a hypothetical negotiated rate and similar calculations performed. Applicants' respectfully submit that neither

Garcia-Luan-Aceves et al. nor Varma et al., either alone or in combination, show or suggest a method or system for estimating worst-case delay, as set forth in the claims. Garcia-Luan-Aceves et al. disclose a method for maintaining reservation state in a network router. The Examiner first cites paragraphs [0016], [0054], [0066], and [0089] with respect to collecting traffic comprising packet size and arrival time over a time interval. As noted at paragraph [0054], routers only know the rates of incoming traffic on the links and the rates of outgoing traffic for each destination, they do not maintain information on the rates of each flow. Paragraph [0016] notes that the invention provides techniques that replace per-flow state and per-flow processing with mechanisms whose complexity is determined by the network parameters. Paragraph [0066] refers to how classes are based on packet sizes. A shaper is used to shape flows to a form  $(L, p)$ , where  $L$  is the maximum size of any packet of the flow and  $p$  is the rate of the flow. Paragraph [0089] describes classes based on burst-drain-times, which is the time to transmit one bucket at the rate of the flow. The Examiner has failed to point to any teaching of collecting traffic data at a queue of a router, the queue associated with a traffic aggregate over a time interval, and the traffic data comprising packet size and arrival time of each packet arriving at the queue during the time interval, as required by claim 1. With regard to calculating a burst-rate traffic profile responsive to the traffic data collected at the associated rate, the Examiner cites paragraph [0063]. This section of the Garcia-Luan-Aceves et al. patent defines a delay for the flow as the waiting time at the shaper at the ingress node and the propagation delays of the links on the flow's path (see equation in paragraph [0063]). Claim 1 requires that the associated rate is a specified bandwidth for the traffic aggregate. Garcia-Luan-Aceves et al. use  $p$ , which is the average rate of the flow of incoming traffic (see, paragraph [0054]). The Examiner cites the same

equation and parameters from Garcia-Luan-Aceves et al. for calculating a burst parameter and calculating a burst-rate traffic profile (paragraph [0063]). As previously discussed, claim 1 specifies that the periodic worst-case delay is calculated by dividing a burst parameter based on an associated rate, by a share of output link bandwidth allotted to the queue. Garcia-Luan-Aceves et al. simply show a flow delay calculated using a maximum burst size of flow of incoming traffic divided by the average rate of the flow of the incoming traffic (see, paragraphs [0054], [0063], and Fig. 1). Applicants note that on page 4 of the Office Action, the Examiner states that Garcia-Luan-Aceves et al. do not expressly indicate calculating a periodic worst-case delay for the burst-rate traffic profile by dividing a burst parameter by an allocated bandwidth associated with the queue.

Examiner respectfully traversed the argument: First, regarding with the definition indicated in the amended Claim language, ‘allotted’, which by the standard English dictionary means: To parcel out; distribute: to assign as a portion; allocate.

Therefore, although applicant indicates that the amended language “*a share of output link bandwidth allotted to said queue, wherein the share of output link bandwidth is greater than or equal to the associated rate*” means: “As described in the specification, the associated rate is a specified bandwidth, which may be, for example, a negotiated rate agreed to by a customer sending traffic data. This value is used to calculate the burst-rate traffic profile and a burst parameter. After traffic is queued, it is sent out of the router on an output link. The output link has as associated output link bandwidth. Multiple queues can share an output link, with each queue allotted a share of the output link bandwidth. It is this share of the output link bandwidth

that is used to calculate the worst-case delay." However, the amended language does not apply to what applicant intended to claim. And it is being interpreted that the worst case is calculated by dividing the burst parameter by a bandwidth that is assigned/allocated to the queue, and the bandwidth which is greater or equal to the associated rate, which is still reads on by Varma's references. Further, Garcia disclosed wherein the queue is allotted a share of an output link capacity, said share exceeding the associated rate (refer to 0106 or 0057), therefore, either along or in combination, both Varma and Garcia taught the newly amended limitation.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 4, 8, 9, 11, 14, 19, 20, 22, 23, 25, 27, 29, 31, and 33-47 rejected under 35 U.S.C. 103(a) as being unpatentable over Garcia-Luna-Aceves et al hereinafter Garcia (US 2002/0097726) in view of Varma et al hereinafter Varma (US 2002/0073224).

1. Referring Claims 1, 9, 11, 14, 20, 23, 25, 27, 29 and 31, Garcia disclosed: collecting traffic data at a queue of a router, said queue associated with the traffic aggregate over a time interval, the traffic data comprising packet size and arrival time of each packet arriving at the queue during the time interval (refer to 0016, 0054, 0066, and 0089);

calculating a burst parameter (refer to 0053) based on the traffic data collected at said queue and the associated rate ( $\rho$ , rate of the aggregate flow, 0089);

calculating a burst-rate traffic profile responsive to the traffic data collected at said queue over said time interval and the associated rate, wherein the associated rate is a specified bandwidth for the traffic aggregate ( $\rho$ , rate of the aggregate flow, refer to 0063); and

calculating a periodic worst-case delay for the burst-rate traffic profile by dividing the burst parameter by an allocated bandwidth associated with the queue (refer to 0063).

adding up the delay associated with the routers along the path (refer to 0063, where the sum of the  $\tau$  is the sum of propagation delay of the links and the path associated with the routers).

at a router, there must be a processor to processing the calculation (refer to 0110).

Garcia discloses wherein the queue is allotted a share of an output link capacity, said share exceeding the associated rate (refer to 0106 or 0057).

Garcia did not expressly indicate the arrival time of the traffic data is being collected.

Varma disclosed the arrival time of the traffic data is being collected (time is being recorded at certain period, refer to 0067).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine Garcia and Varma since arts are analogous.

The suggestion/motivation would have been that by providing the network parameters needed to determine the worst-case delay, it provides more stability and reliability of the current Internet architecture.

Garcia did not expressly indicate calculating a periodic worst-case delay for the burst-rate traffic profile by dividing the burst parameter by an allocated bandwidth associated with the queue.

Varma disclosed calculating a periodic worst-case delay for the burst-rate traffic profile by dividing the burst parameter by an allocated bandwidth associated with the queue (refer to 0015). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine Garcia and Varma since arts are analogous. The suggestion/motivation would have been that by providing the network parameters needed to determine the worst-case delay, it provides more stability and reliability of the current Internet architecture.

2. Refer to Claim 4, Garcia disclosed wherein the associated rate is negotiated rate agreed to by a customer sending the traffic data (refer to 0053).
3. Referring to Claim 8, wherein the traffic aggregate is a class of traffic (refer to 0106).
4. Referring to Claims 19 and 22, Garcia discloses wherein the computer readable medium is a CD-ROM, floppy disk, flash memory, system memory hard drive, (queue is a storage, a memory, refer to 0110) or data signal embodied in a carrier wave.
5. Referring to Claim 37, Garcia disclosed wherein the associated rate is a maximum average bandwidth specified in a service level agreement (refer to 0053).

6. Referring to Claims 38 and 47, Garcia did not disclose the profile where the y-intercept corresponding to a y-intercept corresponding to the calculated burst parameter and a slope corresponding to the associated rate.

Varma disclosed where the y-intercept corresponding to a y-intercept corresponding to the calculated burst parameter and a slope corresponding to the associated rate (refer to 0013).

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to combine Garcia and Varma since arts are analogous.

The suggestion/motivation would have been that by providing the network parameters needed to determine the worst-case delay, it provides more stability and reliability of the current Internet architecture.

7. Referring to Claim 39, Garcia did not disclose calculating a cumulative bandwidth profile having a slope equal to allocated bandwidth (Fig 18).

8. Referring to Claims 40 and 46, Garcia disclosed calculating error of data by comparing collected data to the burst-rate traffic profile (refer to 0089).

9. Referring to Claims 41, Garcia disclosed calculating a new burst parameter if the error of data is higher than a predetermined limit (refer to 0175).

10. Referring to Claim 42, Garcia disclosed wherein code that causes the processor to calculate the burst-rate traffic profile comprises code that causes the processor to utilize a token bucket (refer to 0053).
11. Referring to Claim 43, Garcia disclosed wherein the token bucket size corresponds to maximum burst rate (refer to 0053).
12. Referring to Claims 36 and 44, Garcia disclosed wherein the burst parameter is calculated utilizing token buckets and the associated rate is set to a negotiated rate for a specified class of traffic (refer to 0053 and 0068).
13. Referring to Claim 45, Garcia disclosed wherein the rate parameter is rate agreed to by a
14. Referring to Claim 33, Garcia disclosed wherein calculating the burst-rate traffic profile comprises utilizing a token bucket (refer to 0053).
15. Referring to Claim 34, Garcia disclosed wherein the token bucket size corresponds to a maximum burst rate (refer to 0053).
16. Referring to Claim 35, Garcia disclosed wherein a replenishment rate of the token bucket is based on the associated rate (refer to 0053).

***Conclusion***

**Examiner's Notes:** Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner. In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karen C. Tang whose telephone number is (571)272-3116. The examiner can normally be reached on M-F 7 - 3.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zarni Maung can be reached on (571)272-3939. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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